

## **THERMAL ICE SCRAPER**

### Background of the Invention

This invention relates generally to windshield ice scrapers and, more particularly,

- 5 to a thermal ice scraper that may be heated in a microwave oven to facilitate the removal of frost, ice, or snow from a smooth surface such as an automobile windshield.

The standard method of removing ice and frost from automobile windshields involves chipping away at the ice with a flat plastic ice scraper that is difficult to hold and ineffective on thick ice. Many people use a de-icing spray to weaken the ice, but this can be 10 expensive and sometimes messy. There is a very high demand for new and innovative means of removing ice and frost from automobile windshields, and car owners everywhere would welcome any improvement made to the standard ice scraper.

Some improved models, however, have other drawbacks. Electric heated ice scrapers are known in the art, such as in U.S. Pat. No. 3,711,679, U.S. Pat. No. 3,935,425, and 15 U.S. Pat. No. 4,930,176, but they require electricity from the automobile, are sometimes difficult or cumbersome to use, and are often expensive. Other electric heated ice scrapers are battery operated, such as in U.S. Pat. No. 5,357,646, but batteries are expensive and can leak, which causes safety concerns and can potentially ruin the scrapers. Additionally, other products that improve upon the standard ice scraper by adding features such as a snow brush or 20 a squeegee are usually too large to conveniently store in the vehicle, too expensive, or simply not useful.

Microwave ovens offer a fast and easy way to heat materials that can be used to supply heat to another object. In general, these materials are either a gel or another moist substance that contains some water and retains heat. Popular uses for such materials include hot packs for muscle pain relief and for keeping food warm. U.S. Pat. No. 5,369,257 uses a 5 microwave-heatable material placed directly on a windshield to defrost the windshield, but it has poor scraping characteristics; when its material cools off from use, it must be reheated in the microwave to continue clearing the windshield.

Therefore, it is desirable to have an ice scraper that transfers heat to windshields to aid in snow and ice removal, is heated in microwave ovens to provide its source of thermal 10 energy, does not require electricity from automobiles or batteries, has good scraping characteristics, is comfortable and easy to use, can be conveniently stored in vehicles, and is relatively inexpensive.

#### Summary of the Invention

15 A thermal ice scraper for use in cleaning frozen precipitation from automobile windshields according to the present invention includes a body portion, a blade portion, and a heatable material in the body portion that can heat the edges of the blade portion. When in use, the thermal ice scraper is heated in a microwave oven, causing the heatable material in the body portion to become hot and transfer heat to the edges of the blade portion. The thermal ice 20 scraper is then held in a hand and used to scrape a smooth surface, such as an automobile windshield. The heat along the edges of the blade portion facilitates the removal of frost, ice, or snow while the body portion comfortably accommodates the hand and the blade portion

allows multi-directional usage of the scraper. The body and blade portions may be permanently or removably attached, and a conductive element may be included to aid in transferring heat to the edges of the blade portion. The thermal ice scraper further includes a vacuum air space for insulating the body portion to keep the hand from being burned.

5 Therefore, a general object of this invention is to provide an ice scraper that can retain heat and transfer the heat to the edges of a blade portion to facilitate snow and ice removal.

Another object of this invention is to provide an ice scraper, as aforesaid, that does not require electricity from automobiles or batteries.

10 Still another object of this invention is to provide an ice scraper, as aforesaid, that can be heated in microwave ovens to provide a source of thermal energy.

Yet another object of this invention is to provide an ice scraper, as aforesaid, that has good scraping characteristics.

15 A further object of this invention is to provide an ice scraper, as aforesaid, that is ergonomic and easy to use.

A still further object of this invention is to provide an ice scraper, as aforesaid, that can be conveniently stored in vehicles.

Other objects and advantages of this invention will become apparent from the following description taken in connection with the accompanying drawings, wherein is set forth  
20 by way of illustration and example, embodiments of this invention.

### Brief Description of the Drawings

- Fig. 1a is a front perspective view of a thermal ice scraper according to a now preferred embodiment of the present invention;
- 5 Fig. 1b is a top view of the thermal ice scraper as in Fig. 1a;
- Fig. 1c is a sectional view taken along line 1c—1c of Fig. 1b;
- Fig. 2a is an exploded view of a thermal ice scraper according to another embodiment of the present invention;
- Fig. 2b is a top view of the thermal ice scraper as in Fig 2a;
- Fig. 2c is a sectional view taken along line 2c—2c of Fig. 2b;
- 10 Fig. 2d is an isolated sectional view of a snap-type connection between a body portion and a blade portion of the thermal ice scraper as in Fig. 2c;
- Fig. 3a is front perspective view of a thermal ice scraper according to still another embodiment of the present invention;
- Fig. 3b is a front view of the thermal ice scraper as in Fig. 3a;
- 15 Fig. 4a is a top view of a thermal ice scraper according to yet another embodiment of the present invention;
- Fig. 4b is a sectional view taken along line 4b—4b of Fig. 4a;
- Fig. 4c is a top view of a thermal ice scraper according to a further embodiment of the present invention;
- 20 Fig. 4d is a sectional view taken along line 4d—4d of Fig. 4c;
- Fig. 5a is a front perspective view of a body portion according to an embodiment of the present invention;

Fig. 5b is a front perspective view of a blade portion according to an embodiment of the present invention;

Fig. 5c is a front perspective view of a blade portion according to another embodiment of the present invention;

5 Fig. 5d is a front perspective view of a blade portion according to still another embodiment of the present invention;

Fig. 5e is a front perspective view of a blade portion according to yet another embodiment of the present invention;

10 Fig. 5f is a front perspective view of a blade portion according to a further embodiment of the present invention;

Fig. 6a is a top view of a thermal ice scraper according to a still further embodiment of the present invention;

Fig. 6b is a sectional view taken along line 6b—6b of Fig. 6a; and

Fig. 6c is a front perspective view of the thermal ice scraper as in Fig. 6a.

### Description of the Preferred Embodiment

A thermal ice scraper according to the present invention will now be described with reference to Fig. 1a through 6c of the accompanying drawings. More particularly, a thermal ice scraper 100 according to a now preferred embodiment includes a body portion 110 fixedly attached to a blade portion 120 having at least one peripheral blade edge 121 (Figs. 1a – 1c). Thus, the body 110 and blade 120 portions have a monolithic construction although other removable configurations are possible as will be further described later. The body portion 110 defines a chamber 112 that is in communication with an interior space 122 defined by the blade portion 120.

10 A heatable material 150 is positioned in chamber 112 and interior space 122. The heatable material 150 is preferably a microwavable gel capable of fitting any shape and reaching very high temperatures quickly, but other moist substances that contain some water and retain heat would also be suitable, such as polymer crystals or various grains, pellets, and granulated materials that absorb some moisture and can be heated in a microwave. The  
15 heatable material 150 may be directly injected into the body portion 110 during manufacturing of the ice scraper 100, and a safety valve (not shown) may be necessary to prevent explosion if overheated.

The body portion 110 includes an outer wall 116 spaced apart from an inner wall 117 to create an intermediate space 118 (Fig. 1c). The intermediate space 118 is preferably a  
20 vacuum, which does not disrupt the method of microwave heating, provides an excellent insulating layer, and still allows some heat to reach the outer wall 116 to provide a desired hand-warming effect by radiating through the intermediate space 118 and by conducting up

from the blade portion 120. Alternatively, conventional insulating material may be positioned in the intermediate space 118.

It is understood that both the body portion 110 and the blade portion 120 may utilize one of several ergonomic configurations. The shape of the body portion 110 determines 5 how comfortable and easy to use the thermal ice scraper 100 is. The bell shape 110a, shown throughout the drawings and in Fig. 5a in particular, and the cylinder shape 110b (Figs. 4a and 4b) have rounded tops that fit the palm of a hand well and allow the thermal ice scraper 100 to be used in any direction. The pistol grip shape 110c (Figs. 4c and 4d) has the advantage of being at an angle that is nearly aligned with the bevel angle of the blade, making it much easier 10 for the user to direct force for digging into the ice, and prevents the blade from skipping over the top. The tall, narrow shape of the pistol grip 110c, however, does not provide the best conditions for heat transfer, as some of the heat would be trapped near the top instead of moving down to the blade portion 120. Further, while the bell shape 110a and cylinder shape 110b may be used in any direction, the pistol grip shape 110c can only be held one way.

15 The shape of the blade portion 120 largely determines the scraping characteristics of the thermal ice scraper 100. In general, the round shape 120b (Fig. 5e) has the advantage of working equally well in all directions. It also contacts the ice in a different way than a flat edge would; the initial contact is made at one point and spreads out as it gets under the ice. In some situations, this will cause the ice to be lifted up in large pieces rather than being smashed into 20 small pieces as it usually is with a flat edge. Lip 127 may be added to the round blade 120b to help deflect and break ice during the aforementioned lifting (Fig. 3a). In many cases, however, having a flat edge or a wedge shape where two sides meet would be useful in chipping and

splitting up ice. This is the main advantage of the triangular shape 120c (Fig. 5f). Another benefit of the triangular shape (or any multi-sided shape) is that each side could have a unique function. For example, one side could have teeth for breaking up thick ice while another side has a rubber squeegee for cleaning water and ice debris from the windshield. The flat, sharp edges of a triangle would also be useful in creating a hole in the ice to use as a starting point. A combination of the two 120a, shown throughout the drawings and in Fig. 5c in particular, is the preferred shape since it provides the multi-directional usage of the round blade 120b with the ice breaking benefits of the triangular blade 120c. The combination shape 120a may be outfitted with teeth on one flat edge and a squeegee or other alternative blade on the other flat edge (Figs. 3a and 3b). The combination shapes 120d (Fig. 5b) and 120e (Fig. 5d) would also offer advantages of both the circular shape 120b and the triangular shape 120c.

The body portion 110 and blade portion 120 are preferably constructed of a durable plastic material that will not chip or crack during use or melt from the thermal loads imposed by the microwave oven and the heatable material 150, though other suitable materials may be used. Further, the body portion 110 and blade portion 120 may be a monolithic construction, and any combination of the body portion shapes and blade portion shapes listed above should be small enough to be conveniently stored in vehicles.

In use, the thermal ice scraper 100 is heated in a microwave oven, causing the heatable material 150 to become hot and transfer heat to the edges of the blade portion 120. The thermal ice scraper 100 is then held in a hand and used to scrape a smooth surface, such as an automobile windshield. The heat along the edges of the blade portion 120 facilitates the

removal of frost, ice, or snow while the body portion 110 comfortably accommodates the hand and the blade portion 120 allows multi-directional usage of the scraper.

A thermal ice scraper 200 according to another embodiment of the present invention is shown in Figs. 2a through 2d and includes a construction substantially similar to 5 the construction previously described except as specifically noted below. More particularly, the thermal ice scraper 200 according to this embodiment includes a conductive element 230 to aid in transferring the heat from the heatable material 150 to the edges of the blade portion 120.

The conductive element 230 has a contact portion 231, at least one transfer portion 232, and a rim 233. The transfer portion 232 and rim 233 are positioned inside blade portion 10 120 and are sandwiched between an upper blade portion 120a and a lower blade portion 120b. The contact portion 231 is positioned to be in communication with the heatable material 150 when the body portion 110 and the blade portion 120 are connected. The body portion 110 and the blade portion 120 are preferably connected in a snap-fit connection (Figs. 2c and 2d). Therefore, the body portion 110 is removably and releaseably coupled to the blade portion 120 15 (Fig. 2a).

In use, the body portion 110 is heated in a microwave oven, causing the heatable material 150 to become hot. The body portion 110 is then connected to the blade portion 120, causing the contact portion 231 to be in communication with the heatable material 150. The heat is then transferred down the transfer portion 232 to the rim 233, causing the edges of the 20 blade portion 120 to become heated. For maximum heat transfer to the edges of the blade portion 120, the rim 233 would ideally be as close as possible to the outside surface of the blade portion 120. The conductive element 230 could be relatively thin and tightly sandwiched

between the upper and lower blade portions 120a and 120b to insulate the interior portion of the blade portion 120 but allow heat to spread evenly on the outer edges of the blade portion 120, where the plastic is thinner and thus less insulative.

With the two-piece embodiment, multiple body portions 110 and blade portions 120 with shapes as discussed above may be combined to take advantage of different features for different scraping conditions. The heated body portion 110 may also be utilized as a warming device (such as a pocketsize hand warmer) when not connected to the blade, though this may require an additional component to cover the heatable material 150 and make the device safe for use. The two-piece embodiment also allows the heatable material 150 to consist of injected materials as discussed above or a removable gel pack. The removable gel pack could be conventional or sodium-acetate, which would allow the pack to be heated without a microwave for its first use.

A thermal ice scraper 300 according to still another embodiment of the present invention is shown in Figs. 6a through 6c and includes a construction substantially similar to the construction previously described except as specifically noted below. More particularly, the thermal ice scraper 300 according to this embodiment includes a conductive element 330 that acts as the scraping blade and transfers the heat from the heatable material 150 to the surface being cleaned. The conductive element 330 should be made of a conductive material that can be used on glass without scratching the surface of the glass being cleaned. Brass is one metal that is capable of this because its hardness (a measure of how much energy is required to dent a material) is much less than that of glass. Brass is also an excellent conductor of heat and is currently the preferred material for this embodiment of the present invention although bronze

or copper are other metals with similar characteristics. This method would be the most direct way to apply the heat to the ice as it is being scraped.

A thermal ice scraper (not shown) according to yet another embodiment of the present invention includes a construction substantially similar to the construction previously 5 described except as specifically noted below. More particularly, the thermal ice scraper according to this embodiment includes a temperature indicator on the outside of the thermal ice scraper to show when it is hot, warm, or cold. This will let the user know if the product has reached the proper operating temperature and could be many substances, including stick-on temperature indicators similar to those found on aquariums.

10 It is understood that while certain forms of this invention have been illustrated and described, it is not limited thereto except insofar as such limitations are included in the following claims and allowable functional equivalents thereof.